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Impacts of COVID-19 on the Child Care Sector: Evidence from North Carolina

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Abstract

COVID-19 has created acute challenges for the child care sector, potentially leading to a shortage of supply and a shrinking sector as the economy recovers. This study provides the first comprehensive, census-level evaluation of the medium-term impacts of COVID-19 on the county child care market in a large and diverse state, North Carolina. We also document the disproportionate impacts of COVID-19 on different types of providers and disadvantaged communities. We use data from two time points (February and December) from 2018 to 2020 and a difference-in-differences design to isolate the effects of COVID-19. We find that COVID-19 reduced county-level child care enrollment by 40%, and reduced the number of providers by 2%. Heterogeneity analyses reveal that family child care providers experienced not only less severe reductions in enrollment and closures than center providers, but a small growth in the number of family providers. Declines in enrollment were most substantial for preschool-aged children. COVID-19 did not appear to further exacerbate inequities in terms of enrollment amongst low-income communities, communities with a larger share of Black residents, or rural communities, although communities with a larger share of Hispanic residents had more provider closures. Our findings underscore the importance of family child care providers in the child care sector and providing continuing and targeted support to help the sector through this crisis. Implications for future policies are discussed.

Keywords: child care, COVID-19, supply and demand, child care inequities

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Introduction

By the most recent estimates, 60% of the children ages birth to five years in the US attend at least some non-parental care (National Household Education Surveys Program, 2016). High-quality child care can generate substantial benefits in children's academic and socioemotional development, especially for children from disadvantaged and marginalized families (Duncan & Magnuson, 2013; Magnuson & Duncan, 2016). However, COVID-19 has created acute challenges for the child care sector, potentially leading to a shrinking sector and supply shortages when the economy recovers. In contrast to the rising demand for child care as parents return to work, many child care providers may not be able to reopen or remain open due to the sharp drop in revenue and increase in costs to meet new safety and health standards; 44% of surveyed providers could not say how much longer they were able to remain open as of December 2020 (National Association for the Education of Young Children [NAEYC], 2020a). By one estimate, COVID-19 could impose a loss of 4.5 million child care slots -- half of the country's licensed child care capacity (Jessen-Howard & Workman, 2020).

Although there is good descriptive information on the detrimental effects of COVID-19 on the child care sector (e.g., Bipartisan Policy Center, 2020a; NAEYC, 2020a; 2020b), only one study thus far has causally examined these effects (i.e., Ali et al., 2020). Using state-level online job postings and statistics on internet searches for child care as proxies for supply and demand, Ali and colleagues (2020) found that the adoption of Stay-at-Home-Orders (SAHOs) led to a 13% decrease in the number of child care job postings in the first two months of the pandemic (i.e., March and April 2020), signaling large adverse effects on the child care supply. Because of the challenges in obtaining real-time data, most existing studies only describe the immediate impacts of COVID-19 in the first few months of the pandemic. Moreover, these studies often use

voluntary survey data from providers, which only include a small fraction of all the providers in the industry and have low response rates in some states (Bassok, Markowitz, et al., 2020; Bipartisan Policy Center, 2020a; NAEYC, 2020a). To date, no study has used census-level data to rigorously evaluate how local child care markets are impacted by the pandemic. Policymakers need timely and rigorous evidence documenting the child care sector's responses to the pandemic in different phases to gauge the scale of the problem and support needed.

Our study fills this gap by examining the medium-term impacts of COVID-19 on the child care sector using county-level records of enrollment and provider opening status in North Carolina (NC) from two data points (February and December) in the years leading up to, and during the pandemic (2018-2020). We define the onset of COVID-19 in March 2020 when NC mandated its first SAHO. To isolate the effects of COVID-19, we employ a difference-in-differences design to account for the confounding effects of seasonal changes and cross-county differences. North Carolina provides a useful context because they adopted their SAHO on March 30, 2020, and lifted it on May 22, 2020, which represents the typical length of SAHOs in most states (Raifman et al., 2020). As a large and diverse state, NC also has a growth trajectory of COVID-19 cases that closely mirrors the national trends (Figure 1). Our estimates thus reflect COVID-19's direct effects on the child care sector, as well as the indirect effects through the SAHO implementation.

Another important yet unaddressed question is, which providers and communities are the most affected by COVID-19, and to what extent? Among providers of varying types and sizes, there is unequal access to government relief packages. Nationally, while 72% of large centers received funding through the Paycheck Protection Program, only 29% of small centers and 17%

of child care family child care providers did as of July 2020 (NAEYC, 2020b).[1] At the same time, family child care providers may have a relative advantage in the context of COVID-19, offering more flexible services and with smaller group sizes than centers (Porter et al., 2020). COVID-19 may also pose more challenges for providers to serve infants and toddlers because care for this age group is costly to provide and difficult for families to afford (Jessen-Howard et al., 2020). Additionally, higher quality providers usually have higher operating costs, and may be at a greater risk of closure when enrollment drops, reducing the average quality of remaining providers.

The shortage of safe, stable, and affordable child care has likely exacerbated the income, racial, and geographic inequities in early care and education (ECE) that existed before the pandemic (Malik et al., 2020). Prior to COVID-19, low-income and rural communities had fewer total ECE providers, as well as fewer high-quality providers (Bassok et al., 2012; Bassok & Galdo, 2016; Li-Grining & Coley, 2006; Malik et al., 2020); communities of color were less likely to have high quality early learning opportunities (Bassok & Galdo, 2016; Hatfield et al., 2015), and to have providers who participate in their state's Quality Rating and Information System (Jenkins et al., 2021). These pre-existing inequities could increase with the compounding risks of COVID-19 in these communities, such as financial instability, unemployment, a "digital divide," housing insecurity, and structural racism (Daily & Kazi, 2020; Malik et al., 2020; Mitchell, 2020; Ullrich, 2020). Combining the NC data with county characteristics from the American Community Survey (ACS), we test for heterogeneous impacts of COVID-19 to assess any widening inequities across an array of provider and county characteristics (i.e.,

[1] Large centers were defined as centers serving 50 children or more in this study.

family/center, age groups served, provider quality, communities of color, county socioeconomic status, urbanicity).

Our study makes several distinct contributions to the rapidly growing literature on COVID-19's impacts on the child care industry. We are one of the first to provide an estimate of the medium-term impacts of COVID-19 using up-to-date, county-level data with rich information about enrollment, provider opening status, and provider characteristics. A unique advantage of the NC data is that a majority of the providers reported their enrollment and opening status during COVID-19, resulting in a much higher response rate than prior studies (~ 90%).[2] Second, taking advantage of multi-year data, we improve the precision of estimates from previous descriptive studies using a rigorous difference-in-differences design to account for seasonal trends and county-specific unobserved characteristics. Finally, our study provides regression-adjusted estimates of the impacts of COVID-19 on different types of child care providers and communities. In doing so, we assess any potentially widening inequities and identify which providers and communities are the most in need of immediate and long-term investments. We also contribute broadly to the literature on the impacts of economic downturns and natural disasters on the child care sector, as well as the literature on the impacts of COVID-19 on educational inequity.

Background

Impacts of COVID-19 on the Child Care Sector

[2] While we do not directly observe providers' responses in the provider-reported, county-level survey data we obtain, by comparing the number of providers in the provider-reported survey data in February 2020 (i.e., the pre-COVID period) with the statistics in the administrative record of all licensed providers in the same month, we find that the average percentage of providers responded to the survey data across counties in February is 93%. We describe the data sources in the Data section and in more detail in Appendix A.

The NAEYC collected information from a non-randomized national sample of over 6,000 individuals working in child care centers or family child care homes in March, April, June, and November 2020.[3] Starting in March, 47% of the respondents anticipated that they would not survive being closed for more than two weeks without public support (NAEYC, 2020c). In April, nearly half of the respondents reported closure.[4] Of the respondents that remained open, 65% were operating at a capacity lower than 25%. Nearly 40% of respondents needed to lay off or furlough employees, or were laid off or furloughed themselves (NAEYC, 2020d). In June, more respondents reopened with only one-third of normal enrollment on average, and 18% of child care centers and 9% of child care homes were still closed. Meanwhile, 70% of the respondents were facing increasing costs to meet the reopening health and safety standards; they took on debt, used personal savings, and cut staff to compensate (NAEYC, 2020b). The latest survey in November reported that although 93% of respondents were open, almost half of them were experiencing financial deficits and were uncertain about how long they could remain open (NAEYC, 2020a). Nearly half of the respondents reported that multiple providers closed permanently in their community (NAEYC, 2020a). Although these surveys provide a snapshot of the evolving child care conditions during different phases of COVID-19, they only include a small cross-section of providers in each state, with varying response rates across states. Thus, the estimates may not be representative of the conditions in each state.

A growing number of reports have also descriptively examined similar trends in local markets such as California (Doocy et al., 2020), Cleveland (PRE4CLE, 2020), Louisiana (Bassok, Markowitz, et al., 2020), Nebraska (Daro & Gallagher, 2020), New Jersey (Advocates

[3] The specific number of providers who responded to each of the surveys varied.
[4] The reasons for closure were not reported in the NAEYC report and could be mandatory or voluntary closures. It was also unclear whether these were temporary or permanent closures.

for Children of New Jersey, 2020), Pennsylvania (Sirinides et al., 2020), and Virginia (Bassok, Michie, et al., 2020). Similar to the NAEYC reports, they used administrative and survey data to compare the cross-sectional differences before and after the pandemic hit in 2020. Because of the challenges of collecting real-time data during COVID-19, most of these analyses used data from the first three months of the pandemic, and therefore have low response rates (Bassok, Markowitz, et al., 2020). The continuing impacts of COVID-19 after June 2020 are largely unreported in the current literature.

Ali et al. (2020) is the only study estimating the immediate causal effects of COVID-19 on the child care market, using online job postings and internet searches for child care in all states as proxies for supply and demand, respectively. The authors used a difference-in-differences design, exploiting variation in states' timing of SAHOs. They found that the implementation of SAHOs led to a 13% decrease in child care job postings per day but no discernable effects on child care searches online, suggesting SAHOs had immediate effects on child care supply, as measured by employment, but little impact on parental demand. However, this study only evaluated the immediate impacts of SAHOs from mid-March to mid-April.

In a related study, Brown and Herbst (2021) examined the sensitivity of the child care industry to the macroeconomic environments using longitudinal national employment data before COVID-19. They found that the child care industry was more responsive to economic downturns than other comparable industries, and recovered more slowly than the rest of the economy after a recession. Economic downturns reduced the supply of child care, particularly the number of slots in center-based child care, creating challenges for parents to access care in their neighborhood. These findings underscore the importance of understanding the effects of

COVID-19 on the child care sector and making necessary and quick public investments to support economic recovery.

Disproportionate Impacts of COVID-19 on Different Types of Providers

Some studies found that COVID-19 had a more profound effect on certain types of providers. For example, Ali et al. (2020) found that SAHOs mostly impacted the job postings of private child care providers, whereas public pre-kindergarten and Head Start programs' hiring was unaffected. Providers of varying types and sizes also had unequal access to government relief packages. While 72% of large centers received funding through the Paycheck Protection Program, only 29% of small centers and 17% of family child care providers did (NAEYC, 2020b).[5] Family child care providers were also more likely to be denied for their Paycheck Protection Program loan application (NAEYC, 2020e).

The types of care that are the most costly to provide may also be hit the hardest by COVID-19. In particular, providers serving infants and toddlers may be disproportionately affected (Jessen-Howard et al., 2020). Given the pre-existing shortage of infant and toddler care before the pandemic, child care needs for this age group would only grow more severe. Additionally, higher quality providers have higher operating costs, and therefore may be at a greater risk of closure than lower-quality providers when enrollment drops. Parents who experience pay cuts, furloughs, or unemployment may settle for lower-quality but less expensive care, further reducing the revenue of these providers. Any potential decline in the supply of high-quality providers is concerning, particularly for disadvantaged communities, which have already had limited access to high-quality child care (Bassok & Galdo, 2016). Understanding which

[5] Large centers were defined as centers serving 50 children or more in this study.

providers are most impacted by the pandemic can help policymakers create targeted plans to assist the most financially vulnerable providers in the child care sector.

At the same time, it is possible that some providers demonstrate greater resiliency or responsiveness to the COVID crisis. For example, family child care providers typically offer more flexible services and can quickly adapt their practices to meet the changing conditions and parental needs (National Survey of Early Care and Education Project Team, 2016a). With smaller group sizes and fewer total children than centers, parents may feel safer enrolling their children in family child care settings (Porter et al., 2020). Lower tuition costs at family providers may also be more tenable for parents experiencing financial struggles. In fact, Brown and Herbst (2021) reported that economic downturns primarily reduced the supply of child care centers, whereas the supply of family child care increased. These unique features of family child care providers may enable them to play a larger role in the large-scale policy responses to COVID-19. Indeed, national provider surveys have consistently reported higher rates of opening among family child care providers than center care providers (Bipartisan Policy Center, 2020a; NAEYC, 2020d). Another survey by the Erikson Institute found that over 90% of the family child care providers in California and Wisconsin were open between March and June 2020 when many child care centers closed (Porter et al., 2020). Some family providers also undertook the role of providing family and community support, connecting families with COVID-19 resources and information, as well as providing emotional support (Porter et al., 2020). Furthermore, opening a new family child care business may provide opportunities for unemployed or furloughed workers to rejoin the workforce or earn some extra income in a weak job market (Brown & Herbst, 2021).

Disproportionate Impacts of COVID-19 on Different Communities

Prior to COVID-19, disparities in ECE availability, affordability, and quality long existed across communities in different socioeconomic strata and geographical locations. For example, there are fewer high-quality ECE opportunities in low-income communities (Bassok & Galdo, 2016; Bassok et al., 2012; Li-Grining & Coley, 2006; National Survey of Early Care and Education Project Team, 2016b) and in communities of color (Bassok & Galdo, 2016; Hatfield et al., 2015; Malik et al., 2018), where providers are less likely to participate in state Quality Rating and Information Systems (Jenkins et al., 2021). Rural areas also have fewer child care slots per demanded slot compared with urban areas, and most rural census tracts can be considered "child care deserts" (Malik & Hamm, 2017).

The child care shortage during COVID-19 is likely to exacerbate these pre-existing economic, racial, and geographical inequities. Families are struggling to meet basic needs, including food, housing, health care, and the internet, which has become a modern-day necessity for accessing government programs, education, and most aspects of everyday living (Daily & Kazi, 2020; Malik et al., 2020; Mitchell, 2020). There are also higher rates of COVID-19 infection and mortality in communities of color (Gross et al., 2020; Hooper et al., 2020; McLaren, 2020). Additionally, programs owned by and serving Black and Hispanic communities are more likely to experience structural racism when applying for financial assistance programs such as small business lending (Malik et al., 2020; Ullrich, 2020). In the latest NAEYC report (2020a), over half of the minority-owned programs said that they would not survive for more than three months under the status quo.

In K-12, studies have begun to document the learning loss caused by COVID-19. It is likely that all students experience substantial learning losses in reading and math, and low-SES students and students of color will lag further behind (Azevedo et al., 2020; Dorn et al., 2020;

Kuhfeld et al., 2020). In turn, such losses could occur in ECE, especially for low-income children and children of color who usually benefit the most from early learning opportunities (Ladd, 2017; Magnuson & Duncan, 2016). To date, there is little evidence about how COVID-19 is specifically affecting the essential ECE opportunities for children across different communities.

North Carolina's Child Care Sector during COVID-19 and the State's Response

North Carolina's child care provider data collected by the NAEYC closely mirror the national trends, although NC providers reported relatively smaller drops in enrollment and fewer closures compared to the national average. In April 2020, 1 in 3 providers were closed in NC (NAEYC, 2020f). As more providers reopened in July, respondents reported that their enrollment was down by 52% (NAEYC, 2020g). In November, 35% of the respondents said they knew child care closures in their community (NAEYC, 2020h).

In NC's state-level response to COVID-19, the Governor signed Executive Order 116 declaring a state of emergency on March 10, 2020. While several businesses, services, and gatherings were restricted during the following days (including school closures on March 14, 2020), Executive Order 121 officially mandated the first SAHO on March 30. The state lifted restrictions throughout the year in different reopening phases. With a new wave of COVID-19 infections hitting NC in the last months of the year, the Governor called for a modified SAHO on December 11, requiring that residents stay at home during overnight hours.

Child care services were subject to strict regulations through the Executive Orders released between March and May.[6] They were mandated to close for regular business, and finally

[6] Between April 8 and May 8, child care providers were only allowed to offer in-person services exclusively for children of essential workers, children receiving child welfare services, or children who were homeless. Providers who wished to open during this period needed to apply to serve as Emergency Child Care Providers (Executive Order 130). After May 8, Executive Order 138 allowed child care providers to open to children of employees of

allowed to open to serve all children as part of the Phase II measures, as long as they followed health and safety guidelines (Executive Order 141). In terms of financial support, NC child care providers received grant disbursements totaling $118 million from the supplemental Child Care and Development Block Grant, funded by the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act. The funding per pupil was on the higher end of the financial support awards granted to states (i.e., relative to NC's 0- to 4-year-old population).[7] North Carolina estimated that 70% of this funding was used to support child care providers who had temporarily closed or seen a decrease in enrollment; 25% of the funding was distributed to cover expenses to provide child care for essential workers (Bipartisan Policy Center, 2020b). The CARES Act funding and another $60 million of state supplemental funding supported all child care providers, open or closed, for April through June (Bipartisan Policy Center, 2020b). North Carolina also disbursed two operational grants to support providers that were open during the pandemic. Emergency child care centers that opened in April for essential workers received between $500 and $30,000 per month opened, or between $359 and $2500 for family child care homes (Bipartisan Policy Center, 2020b). In September, the Governor announced $35 million in operational grants to providers offering in-person services during August, September, and October (House Bill 1105, 2020). The specific amounts to each provider followed an allocation formula based on enrollment, quality rating, the proportion of enrollment subsidized, and the number of infants and toddlers (NC Department of Health and Human Services, 2020). Overall, NC has been relatively responsive in the child care sector during the COVID-19.

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businesses that were not closed by another Executive Order (Phase I). Providers still needed to submit an application for reopening and meet the health and safety guidelines. Finally, on May 20, as part of the Phase II measures, child care businesses were allowed to open to serve all children as long as they followed health and safety guidelines (Executive Order 141).

[7] Author's calculation based on the CARES Act funding information provided by the Office of Child Care at the Administration of Children and Families and 0- to 4-year-old population 2019 estimates produced by the KIDS COUNT Data Center using data from the Census Bureau.

Present Study

Our study evaluates the medium-term impacts of COVID-19 on the county-level child care market in the context of NC, a large and diverse state that offered substantial supports to providers during the crisis. Stable, high-quality child care is critical for young children's early learning and development, particularly those from socioeconomically, racially, and geographically disadvantaged groups. A healthy child care sector also plays an essential role in economic recovery and could have long-lasting influences on economic growth after COVID-19. To date, documentations of the damaging impacts of COVID-19 on the child care sector are mostly descriptive, and focus on the immediate impacts of COVID-19 in the first few months of the pandemic using survey data with a small sample of providers. No study has examined the differential impacts of COVID-19 on the child care sector among different types of providers and communities. Our research questions are:

1. What are the medium-term impacts of COVID-19 on the child care market (i.e., number of open providers and enrollment) at the county level?
2. Do the impacts of COVID-19 on enrollment and provider closures vary by provider type (home/center), age group (infants and toddlers, preschoolers, school-age children), and provider quality (measured by quality ratings)?
3. Do the impacts of COVID-19 vary by county characteristics (i.e., percentage of Black residents, percentage of Hispanic residents, socioeconomic status, and urbanicity)?

Methods

Data

Our data come from two main sources. For 2018 and 2019, we use monthly administrative data of all child care providers serving ages 0 to 12 in NC. The data are collected

by the Division of Child Development and Early Education (DCDEE), from the NC Department of Health and Human Services, and include detailed information about enrollment, capacity, license type, and quality rating of all licensed providers. This information is collected through monitoring visits by the DCDEE. Since these visits were interrupted from March to September 2020 due to the pandemic, our 2020 data come from a daily survey of providers that was initially collected by the DCDEE and then continued by Child Care Resources, Inc. on a weekly basis. These data are collected at the provider level and generously provided to us at the county level at two time points: February and December 2020. We thus aggregate the 2018 and 2019 data at the county level and use February and December in each year to match the 2020 data. Our dataset captures each of the 100 counties from 2018-2020, with two measures per county, per year (February and December), giving us a total sample size of 600 county-month-year observations.

The primary concern from combining the two data sources is that the provider survey in 2020 was voluntary, so not all providers responded to the survey. However, because monitoring visits were conducted until the beginning of March 2020, we are able to cross-validate our two sources of data in February 2020. We confirm that these two sources overlap substantially in February 2020, suggesting a much higher response rate from providers than reported in prior studies (e.g., NAEYC, 2020a; NAEYC, 2020b). Because DCDEE strongly encouraged providers to report enrollment and some of the relief funding was tied to opening status, providers in NC were more likely to respond to the survey. Specifically, by comparing the number of providers in the survey data with the statistics in the administrative data, we find that the average response rate across counties is 93%. Fifty percent of the counties have a response rate of nearly 100%, with the lowest response rate at 70%. [8] More details are available in Appendix A.

[8] Nevertheless, the non-respondents could still bias our results. The non-respondents could include providers who were open but did not respond and those who were closed. Another concern is that the two reporting sources may

Our outcome variables are the enrollment and number of providers opened at the county level. Table 1 illustrates the descriptive statistics for February and December 2020. Although enrollment was reduced by 41%, on average, between February and December 2020, there is substantial variation across counties, shown in Figure 2. Some counties, such as Polk in the South-West (-96%) experienced a stronger reduction than others in the center of the state, or even Alleghany (+12%), where enrollment slightly increased (Figure 2).

County demographic characteristics for our heterogeneity analyses come from the ACS 2018 5-year-estimates. We include the percentage of the population who are Black, the percentage of the population who are Hispanic, urbanicity, and a socioeconomic status (SES) index that combines the following measures: the percentage of the population with a Bachelor's degree or higher, poverty rate, unemployment rate, the percentage of families with a female householder, the percentage of households receiving SNAP benefits (food stamps), and the (logged) median household income. We create the SES index by averaging the standardized values of the six measures following Fahle et al. (2021). In our heterogeneity analyses by county characteristics, we divide counties by SES quartiles and distinguish between counties that have a Black or Hispanic population above and below the state mean (20% for Black population and 7% for Hispanic).

Empirical Strategy

To account for temporal variation, we employ a difference-in-differences (DID) model. The first difference compares the county-level enrollment and number of providers between February and December 2020. However, there could be pre-existing trends in the child care

lead to some extent of measurement errors in our outcome measures. Considering the challenges in collecting reliable data during COVID-19, we decide to use both sources of data, balancing the rigor of our study and the urgent need for timely knowledge on the impacts of COVID-19 on the child care sector. We recognize these points as the limitations of our study and include them in the Discussion section.

sector that would overestimate the effects of COVID-19. To address this issue, we adjust the raw difference by controlling for the changes between February and December in the two previous years, as well as county fixed-effects to compare counties to their "old selves" in 2018 and 2019, eliminating any observed and unobserved fixed county-specific confounders. Our model is:

$$Y_{cmy} = \beta[December_m * year\ 2020_y] + \gamma December_m + \delta Year2020_y + \phi Year2019_y + \chi_c + \varepsilon_{cmy} \quad (1)$$

where Y_{cmy}denotes an outcome measure for county *c* in month *m* and year *y*. *December* represents an indicator for the month of December (February is omitted). *Year2020* and *Year2019* are year indicators. $\chi_c$represents county fixed effects. $\beta$is our coefficient of interest, and can be interpreted as the difference between December and February 2020 minus the difference between December and February in the two previous years. Standard errors are clustered at the county level. For county heterogeneity analyses, we split the sample by county characteristics and run the same models in Equation (1) on the subsamples of counties, where the outcomes are aggregated for a subset of providers.

Results

Overall Effects of COVID-19 on the Child Care Sector

We first present the medium-term effects of COVID in total enrollment and the number of providers (Table 2). All models are DID models controlling for month, year, and county fixed effects following Equation (1). On average, NC providers experienced a reduction of 858 enrolled children between February and December 2020, relative to the trend in previous years and aggregated to the county level. This represents a 40% decrease in child care enrollment from pre-pandemic levels. Although we find large drops in enrollment, the number of providers were

only mildly affected. On average, only 1 provider per county closed in this time period, equivalent to a 2% decrease in the number of providers available in a county.

Heterogeneity by Provider Characteristics

Our heterogeneity analyses reveal substantial differences in how different types of providers were affected by COVID-19 (Table 3). Panel A of Table 3 presents the heterogeneous effects of COVID-19 on the enrollment by provider type (i.e., child care centers vs. homes) and age groups, respectively, and then by age groups within each provider type. We find that while enrollment in child care centers decreased by an average of 846 children (corresponding to a 41% reduction), enrollment in family child care homes decreased by an average of 14 children per county (a 19% reduction). Enrollment reductions affected providers serving children from all age groups. However, we find steeper reductions in the enrollment of 3- and 4-year-old children compared with the enrollment of infants and toddlers and school-aged children (-48% vs -36% vs. -30%, respectively, $p<0.01$). Further analyses by age groups within centers and homes reveal that these reductions were primarily driven by center-based providers rather than family homes. Notably, family child care homes providing services to children under age 5 had much higher retention rates than child care centers (-29% vs -36%, $p<0.10$, for infants and toddlers; -19% vs -48%, $p<0.01$ for preschoolers).

Panel B of Table 3 shows the differential effects of COVID-19 on the number of providers in each county by provider type, quality rating, respectively, and then by quality ratings within each provider type. An average of 2 center-based providers were closed by December relative to February 2020 (a 4% decrease), after we control for time trends in previous years. By contrast, the number of family child care providers increased by one (a 3% increase). As to the quality of providers defined by the QRIS rating, we find that closures affected higher-

quality providers only (a decrease of one provider on average per county; a 5% reduction), and an increase in 3- and 4-star providers.[9] The reduction in 5-star providers also appears to be driven by center-based providers, although the difference between centers and homes is not statistically significant.

Heterogeneity by County Characteristics

We then investigate whether the effects of COVID-19 varied across different county characteristics (Table 4). Panel A of Table 4 presents the differential effects of COVID-19 on county-level enrollment by urbanicity, the percentage of Black residents, the percentage of Hispanic residents, and quartiles of the SES index. We find no significant differences between counties based on their urbanicity or the percentage of Black and Hispanic residents. Reductions in enrollment are around 40% throughout our specifications. COVID-19 did differentially affect enrollment in counties of varying SES, but always ranging between -35% and -43% across SES quartiles. Contrary to our hypothesis, counties in the top SES quartile experienced the largest drop in enrollment (-43%, $p < 0.01$).

Panel B of Table 4 displays the variation in the effects of COVID-19 on the number of providers by the same set of county characteristics. We find that although rural counties and counties with a higher percentage of Black residents experienced slightly more provider closures (percentage decrease ranging from 2% to 3%) than urban counties and counties with a lower percentage of Black residents in subsample analyses, the differences across these communities are not significant. However, counties with higher proportions of Hispanic residents had significantly more provider closures than counties with less Hispanic residents (-2.9% vs 0.3%, p

[9] An important note is that almost half of providers in our dataset have a 5-star rating, and only 2% of them have 1 or 2 stars.

< 0.10). In terms of the SES, counties in the highest SES quartiles (i.e., third- and top-quartiles) experienced the most provider closures (-3.97% and -3.25%, respectively).[10]

Discussion

The total effects of COVID-19 on child development and educational inequality may never be fully captured by researchers and policymakers; however, it is clear that the crisis laid bare the critical importance of child care for working families. Our study makes important intermediate-term progress in examining how much the child care market suffered during the pandemic, and which providers and communities were disproportionately impacted by the pandemic. Using detailed, county-level panel data from a large and diverse state, our study is the first to document how this emergency "shock" to NC's child care system affected child care enrollment, child care closures, and its differences across communities and sectors, accounting for temporal trends and cross-county differences. The dramatic shifts caused by the pandemic are relevant for the early care and education system for the uncertain future, and therefore its impacts have meaningful implications for early childhood research more broadly.

We find that the pandemic reduced child care enrollment across the state by 40%, and reduced the total number of open providers by 2%. This market shrinkage is consistent with recent NAEYC estimates that most providers in NC were open in June 2020 (NAEYC, 2020g). The decline in enrollment was smaller in scale than found in the NC estimates provided by NAEYC (2020g) in July (40% vs. 52%). On the one hand, it is possible that enrollment gradually recovered from July to December when more parents returned to work and were more

[10] We also conduct additional heterogeneity analyses by age group and quality within rural and urban locales (Table A1), and by county SES within quality rating categories (Table A2). In Table A1, we find that urban and rural counties experienced similar levels of enrollment drop and closure of 5-star providers. In Table A2, the decline in the number of high-quality providers was driven by higher-SES counties, where almost 7% of 5-star providers were closed.

comfortable to send their children to child care with the new safety and health standards in place. On the other hand, the effects we find are likely to be smaller than what would have been found in a simple pre-post comparison because our DID design with county fixed effects removes the effects of both seasonal trends and fixed characteristics of counties and their child care markets from the effects of COVID-19. Importantly, the reductions we find are large enough that COVID-19 could generate long-lasting and serious consequences for the child care industry if the continuing needs of the sector are not properly addressed (Jessen-Howard & Workman, 2020).

However, we find that enrollment reductions and closures vary by provider type and by community characteristics. In particular, family child care providers fared much better through COVID-19; they experienced only a 20% decline in enrollment, and the total number of family care providers *increased* by 3%. This is in contrast to child care centers, where we find a 40% decrease in enrollment and a 4% decrease in the number of providers. This aligns with recent studies showing that child care homes were more likely to remain open during COVID-19 than child care centers (Bipartisan Policy Center, 2020a; NAEYC, 2020d; Porter et al., 2020) and during economic crises as well (Brown & Herbst, 2021).

These findings are likely attributable to the well-known, but historically underappreciated, strengths of family care providers -- small groups with flexible schedules, a wider range of care hours, substantial child care experience, and nimbleness to adapt routines and practices (Gormley, 2007; National Survey of Early Care and Education Project Team, 2015; National Survey of Early Care and Education Project Team, 2016a; Morrisey & Banghart, 2007; Gerstenblatt et al., 2014). Such features became even more important during the pandemic, when families could depend on small “pods” to reduce the risk of contagion, and work alternate hours

as the SAHOs, local risks, and other school closures changed their everyday lives. Additionally, because family child care is usually more affordable than centers, parents may switch to this type of care when facing more financial struggles such as pay cuts and job loss (Brown & Herbst, 2021; Morrisey & Banghart, 2007). The family child care sector also provides an opportunity for individuals who lost their jobs to earn income (by directly providing child care at home) when outside alternative employment opportunities are limited (Brown & Herbst, 2021; Katz & Krueger, 2017). Indeed, these unique abilities of family child care providers to meet the moment in this tumultuous period demonstrate that they are the "unsung heroes" of COVID-19 (Porter et al., 2020).

We also find that declines in enrollment were most substantial for preschool-aged children, showing a 48% decrease from levels prior to the pandemic. This is in contrast to a 36% decrease in the enrollment of infants and toddlers, and a 30% decrease for school-aged children. It is possible that this is closely related to our finding that family child care homes were less impacted in their enrollment of infants and toddlers compared to centers, given the limited supply of infant and toddler care more generally, and that family child care homes serve a greater proportion of infants and toddlers relative to centers, especially for lower-income families (Jessen-Howard et al., 2020; Sandstrom et al., 2018; Sipple et al., 2020; Morrisey & Banghart, 2007). It is noteworthy that while the enrollment of preschool-aged children dropped substantially for child care centers (48%), family child care homes only experienced an 19% decrease in this age group. This would further underscore the important role of family child care homes in the sector more broadly, and during the pandemic crisis.

Our findings also reveal that, with respect to the NC local child care sector, COVID-19 did not appear to further exacerbate inequities in terms of enrollment amongst communities of

color. Providers in communities with a greater share of Black and of Hispanic residents experienced similar reductions in enrollment as communities with greater shares of white residents in our study. However, while child care closures were not significantly different for communities with more Black residents, we did find more provider closures in counties with higher shares of Hispanic population. It is worth mentioning that our community geographic measures are relatively coarse, using racial and ethnic population aggregates at the county level, which may not capture more meaningful local differences in child care access. This is particularly relevant for early education given recent studies that reveal substantial racial segregation in early childhood education programs, which is more stark than that of K-12 schools (Greenberg & Monarrez, 2019). Indeed, researchers have already documented the potentially widening income and racial achievement gaps in K-12 as a result of COVID-19 (Dorn et al., 2020; Kuhfeld et al., 2020).

Perhaps also encouragingly, we do not find any meaningful differences in enrollment and child care closures by county socioeconomic levels or rurality. We defined county-level SES with an index comprising several measures, and the magnitudes of COVID-19's effects were similar across quartiles defined by this measure, with higher-SES communities impacted slightly more. This may be related to our finding that 5-star providers experienced the most closures; these closures were concentrated in higher-SES counties, whereby families with higher SES may be more likely to keep their children at home because of their financial resources (i.e., hire a private caregiver), or the greater job flexibility that comes with jobs that require more education (i.e., the ability to telework) (Bipartisan Policy Center, 2020a). Providers in rural and urban communities were similarly affected by the pandemic as well.

We underscore that our findings do not reveal a lack of inequity in early education for communities of color, low-income communities, and rural areas, only that COVID-19 does not appear to have differentially reduced the enrollment or access to providers in the intermediate-term from where it was prior to the pandemic. Although we find similar decreases in enrollment and in the overall number of providers among all communities, the actual impacts could be larger at the individual level, where families of color still face other barriers to child care, including systemic racism, and experienced the national unrest and reckoning of historic racial inequities in the US during the pandemic (Iruka et al., 2017; Barnett et al., 2013; Shonkoff et al., 2021). This is in addition to the rapidly growing literature showing the differential and harmful impacts of COVID-19 on people of color more generally (Gross et al., 2020; Hooper et al., 2020; McLaren, 2020). Similarly, low-SES and rural areas historically have had fewer child care options than high-SES and suburban or urban areas, whereby low-SES and rural areas can often be "child care deserts'' (Malik et al., 2018; Malik et al., 2020). In these contexts, the marginal impact of the pandemic would be more substantial for low-SES and rural communities, reducing the few choices available to families. There is a long road ahead for addressing these historic inequities compounded with the challenges posed by COVID-19 in early education.

Policy Implications

More critically than ever, quick and well-informed policy responses to the COVID-related child care crisis are needed. While our study highlights changes in the local child care market in NC, it contributes broadly to understanding the national contexts in the US during COVID-19. For example, the 2% market shrinkage we find in NC is consistent with recent national estimates that 93% of providers were open as of November 2020 (NAEYC, 2020a). The 40% decline in enrollment was also similar to the NAEYC national estimates that enrollment

across states decreased by nearly a third (NAEYC, 2020a).[11] Considering NC received a relatively supportive financial package at the first installment of the CARES Act among all states (author's calculation), our study calls attention to continuing financial and administrative support at the national and local levels in the future. A key issue is therefore to stabilize the current level of supply while providing support to providers to reopen and remain open. As we enter the intermediate phase of the pandemic, a rising concern among providers is the increasing costs of COVID protocols (e.g., small group sizes, cleaning protocols, PPE, and other health safety supplies). The COVID relief package passed in December 2020 included $10 billion for the Child Care and Development Block Grant funds to provide critical relief for the child care sector, but falls short of some estimates suggesting the sector requires a $9.6 billion per month to sustain the sector during the pandemic (Ullrich et al., 2020).

Another issue policymakers should consider is to ensure equitable access to the financial relief packages, for the child care sector as a whole, and within the sector among different types of providers. Only 1% of the Paycheck Protection Program (PPP) funding was received by the child care industry (Smith & Suenaga, 2020). Many providers, particularly family child care providers, were unable to access the program and its benefits (Smith & McHenry, 2020; NAEYC, 2020e). And minority-owned child care programs were more likely to be denied access to PPP, likely due to systematic racism in the financing process (Malik et al., 2020). The child care sector was also allocated proportionately less of the PPP funding relative to other sectors given its size (e.g., public administration, management, and utilities; Smith & McHenry, 2020; Smith & Suenaga, 2020). It will be critical moving forward to ensure that (a) the child care

[11] Note that the NAEYC number did not include providers who might have already closed at the time of data collection, thus underestimating the magnitude of the enrollment drop, whereas our study accounts for the loss of enrollment from providers who closed from February 2020, to the extent possible.

sector receives an adequate share of the relief packages, (b) providers are informed about the packages, and (c) the systems for accessing relief are optimized to minimize administrative burden and eliminate racial discrimination for already overburdened providers (Ewen et al., 2021). Some specific recommendations for giving the largest impacts to these funds include paying providers based on enrollment rather than attendance, raising subsidy reimbursement rates, grants for COVID-related costs, and offering paid family leave for child care workers (Ewen et al., 2021).

Family child care providers have proved to be resilient and essential in this crisis, and could play a larger role in stabilizing the child care system and fueling the large-scale economic recovery. However, family child care providers are among the most vulnerable to the COVID-19 crisis, and therefore should be carefully considered in future COVID relief programs. Compared to child care centers, family child care providers reported that they felt the financial impacts more acutely, with a lack of access to affordable health and safety supplies and personal protective gear, in addition to health insurance (Porter et al., 2020). Family child care providers also face more challenges in accessing the PPP loans through banks, which usually set entry barriers such as credit score requirements, business checking accounts, prior client relationships (Smith & McHenry, 2020). Echoing many of the recommendations proposed by several organizations (e.g., Home Grown, 2020; Hunt Institute, 2021; Porter et al., 2020), our study underscores the importance of providing clear and timely information about the latest policies, protocols, and funding opportunities to family child care providers and ensuring their equitable access to funding in the banking system. Furthermore, the research on professional development delivery and content to support family home providers' quality practices and beliefs are relatively underdeveloped compared with that on centers (Forry et al, 2013). Moving this work

forward will be essential to best support family child care homes in providing quality care in the midst of an economic and public health crises, and ensuring providers maintain their own mental and physical health (Gerstenblatt et al., 2014). Assisting efforts to better establish the professional identity of home providers will likely be an essential part of these supports (Gerstenblatt et al., 2014). In the long term, researchers and policymakers should seek to understand if parents will continue to enroll children in family child care programs, and if so, what efforts need to be made to ensure the quality of care because family child care is generally lower-quality and less regulated than child care centers (Bassok et al., 2016).

Additionally, low-income, racial minority, and rural families and communities need targeted support focusing on equity. It may be more critical than ever for policymakers to secure child care supply and expand access to public resources such as the Child Care and Development Block Fund (CCDBG) and local Head Start and Early Head Start programs ((Daily & Kazi, 2020; Kalluri et al., 2021). This involves conducting community outreach activities to understand families' unique needs and providing timely, easily accessible information about child care availability, with clear information about programs by location, hours, ages served, quality rating, and program type (Daily & Kazi, 2020). To support providers serving marginalized populations, in addition to eliminating barriers for them to participate in financial relief resources and assisting with reopening and health and safety protocols, institutionalizing the screening and referral process with health care providers may serve to increase enrollment over time (Garg et al., 2015; Kalluri et al., 2021). In collaboration with local child care agencies, health care providers may incorporate child care arrangements into the health screening process and offer information about the benefits of high-quality child care, as well as local child care resources and child care subsidies (Kalluri et al., 2021). This practice has been recommended by

the American Academy of Pediatrics (2016) but has yet to be widely adopted. Overall, it will be important for states to continually survey providers in diverse communities to provide a clearer picture on how providers are faring and what financial and administrative support they will need (Banghardt & Bedrick, 2020).

Limitations

We also note several limitations to our study. First, the differences in our two data sources may create measurement error in our outcome variables, as well as bias caused by non-respondents in the provider-reported survey data. Specifically, the non-respondents in the December 2020 survey data may include providers who closed and those who were open but did not report. It is thus unclear which direction our estimates may be biased. Second, although our DID design provides a more accurate estimate of COVID-19's impacts on child care providers, we are unable to control for time-varying county characteristics due to data unavailability. Our results should therefore be interpreted with caution. Because we only use county-level data from NC, our results may not generalize widely to other states, or represent the local conditions within NC and across states. Additionally, more fine-grained geographic measures can help to examine local level impacts for communities compared with coarse county level characteristics we use in the study.

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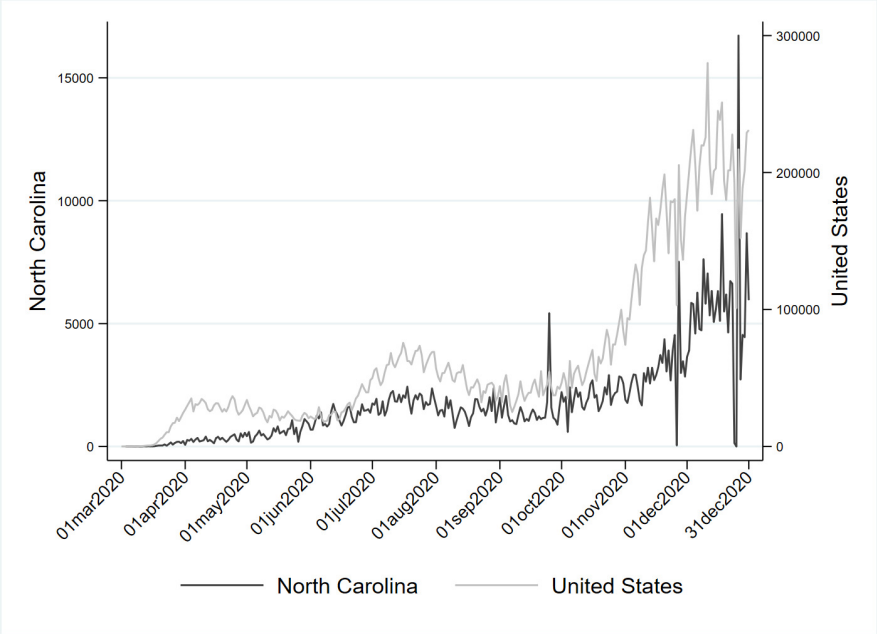
Tables and Figures

Figure 1.

New COVID-19 Cases Reported by Day in North Carolina and the United States



Source: Data from the New York Times, compiled by Badr et al. (2021).

Figure 2.

Change in Enrollment between February and December 2020

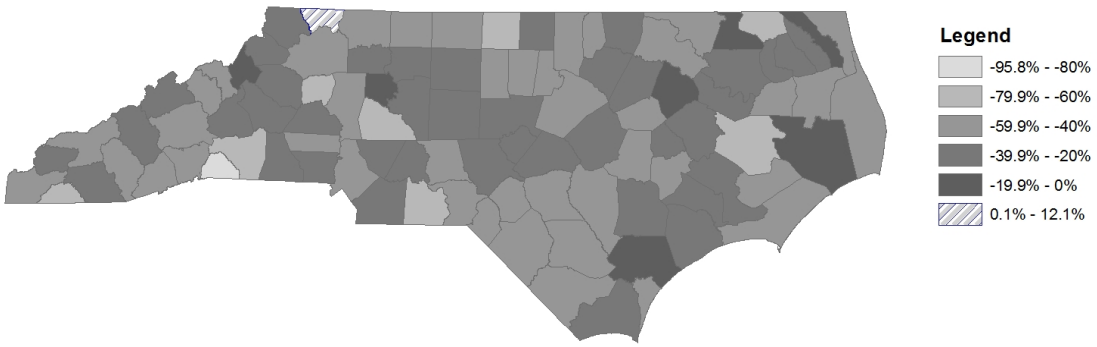


Table 1.

Descriptive Statistics, February and December 2020

Variable	February 2020	December 2020	Difference	% change
Total Enrollment	2150.5	1270.4	-880.2	-40.9%
Number of providers	52.4	49.4	-3.1	-5.8%
Centers vs. family homes				
Enrollment in child care centers	2075.7	1217.1	-858.6	-41.4%
Enrollment in family home care	74.8	53.2	-21.5	-28.8%
Number of center providers	38.8	36.8	-2.0	-5.2%
Number of family home providers	13.6	12.6	-1.1	-7.7%
Ages				
Enrollment 0-2 y.o.	678.3	437.5	-240.8	-35.5%
Enrollment 3-4 y.o.	977.7	523.2	-454.4	-46.5%
Enrollment 5 y.o.	212.9	84.6	-128.3	-60.3%
Enrollment school-age	281.7	225.1	-56.6	-20.1%
Quality				
Number of 1-star providers	2.3	1.6	-0.7	-31.0%
Number of 2-stars providers	1.2	0.4	-0.9	-69.4%
Number of 3-stars providers	11.2	10.5	-0.7	-6.2%
Number of 4-stars providers	14.9	7.6	-7.3	-49.2%
Number of 5-stars providers	22.8	13.9	-8.9	-39.0%
Observations	100	100	100	100

Table 2.

Main Effects of COVID-19 on Total Enrollment and Number of Providers

	Total Enrollment	**Number of Providers**
A) December*2020 coefficient	-858.350**	-1.030*
	(181.755)	(0.469)
B) February 2020 mean	2150.50	52.42
C) Effect in % (A/B)	-39.91%	-1.96%
Observations	600	600

Note. Standard errors in parentheses. + p<.10, * p<.05, **p<.01

Table 3.

Effects of COVID-19 on Enrollment and Number of Providers by Provider Characteristics

Panel A. Enrollment

	Centers	Homes	0 - 2 y.o.	3-4 y.o.	5-12 y.o.	0 - 2 y.o.		3-4 y.o.		5-12 y.o.	
						Centers	Homes	Centers	Homes	Centers	Homes
A) December*2020 coefficient	-845.775**	-14.405**	-243.775**	-467.025**	-147.550**	-232.565**	-9.525**	-461.565**	-3.830**	-151.645**	-1.050
	(178.511)	(4.030)	(68.568)	(89.830)	(27.783)	(64.907)	(3.221)	(88.961)	(1.320)	-28.827	-1.657
B) February 2020 mean	2075.72	74.78	678.31	977.65	494.54	645.32	32.99	957.23	20.42	473.17	21.37
C) Effect in % (A/B)	-40.75%	-19.26%	-35.94%	-47.77%	-29.84%	-36.04%	-28.87%	-48.22%	-18.76%	-32.05%	-4.91%
D) Diff. p-value	0.000			0.000		0.089		0.000		0.006	
Observations	600	600	600	600	600	600	600	600	600	600	600

Panel B. Number of Providers

	Centers	Homes	1-2 stars	3-4 stars	5-stars	1-2 stars		3-4 stars		5-stars	
						Centers	Homes	Centers	Homes	Centers	Homes
A) December*2020 coefficient	-1.525**	0.445*	0.255	1.105**	-0.975**	0.000	0.255*	0.595*	0.510**	-0.960**	-0.015
	(0.419)	(0.205)	(0.159)	(0.269)	(0.273)	(0.103)	(0.098)	(0.247)	(0.171)	(0.275)	(0.062)
B) February 2020 mean	38.79	13.63	3.51	23.34	20.29	1.09	2.42	14.15	9.19	18.60	1.69
C) Effect in % (A/B)	-3.93%	3.26%	7.26%	4.73%	-4.81%	0.00%	10.54%	4.20%	5.55%	-5.16%	-0.89%
D) Diff. p-value	0.000			0.000		0.212		0.598		0.258	
Observations	600	600	600	600	600	600	600	600	600	600	600

Note. Standard errors in parentheses. + p<.10, * p<.05, **p<.01

Table 4.

Effects of COVID-19 on Enrollment and Number of Providers by County Characteristics

Panel A. Enrollment										
	Urban	Rural	Less than 20% Black	More than 20% Black	Less than 7% Hispanic	More than 7% Hispanic	1st SES Quartile	2nd SES Quartile	3rd SES Quartile	4th SES Quartile
A) December*2020 coefficient	-334.375**	-1,789.861**	-617.791**	-1,152.367**	-380.914**	-1,517.667**	-426.820**	-647.440**	-725.740**	-1,633.400*
	(50.269)	(455.062)	(92.923)	(386.192)	(67.471)	(400.709)	-88.77	(157.921)	(196.511)	(663.924)
B) February 2020 mean	859.81	4445.06	1548.31	2886.51	983.14	3762.57	1078.92	1678.72	2046.36	3798.00
C) Effect in % (A/B)	-38.89%	-40.27%	-39.90%	-39.92%	-38.74%	-40.34%	-39.56%	-38.57%	-35.46%	-43.01%
D) Diff. p-value	0.906		0.999		0.900		0.000			
Observations	384	216	330	270	348	252	150	150	150	150
Panel B. Number of Providers										
	Urban	Rural	Less than 20% Black	More than 20% Black	Less than 7% Hispanic	More than 7% Hispanic	1st SES Quartile	2nd SES Quartile	3rd SES Quartile	4th SES Quartile
A) December*2020 coefficient	-0.320	-2.292+	-0.627	-1.522+	0.086	-2.571**	-0.5	1.080*	-2.020**	-2.680+
	(0.297)	(1.173)	(0.487)	(0.859)	(0.359)	(0.951)	-0.61	(0.515)	(0.693)	(1.465)
B) February 2020 mean	24.98	101.19	36.09	72.38	26.67	87.98	31.24	45.16	50.84	82.44
C) Effect in % (A/B)	-1.28%	-2.26%	-1.74%	-2.10%	0.32%	-2.92%	-1.60%	2.39%	-3.97%	-3.25%
D) Diff. p-value	0.553		0.839		0.062		0.002			
Observations	384	216	330	270	348	252	150	150	150	150

Note. Standard errors in parentheses. + p<.10, * p<.05, **p<.01

Table A1.

Heterogeneity by Urbanicity, Age, and Provider Quality

Panel A. Enrollment by Age and Urbanicity						
	0 -2 y.o.		3-4 y.o.		5 - 12 y.o.	
	Rural	Urban	Rural	Urban	Rural	Urban
A) December*2020 coefficient	-74.555**	-544.611**	-199.687**	-942.292**	-60.133**	-302.958**
	(11.989)	(178.795)	(29.711)	(221.289)	(14.698)	(64.196)
B) February 2020 mean	235.55	1465.44	409.14	1988.33	215.13	991.28
C) Effect in % (A/B)	-31.65%	-37.16%	-48.81%	-47.39%	-27.95%	-30.56%
D) Diff. p-value	0.675		0.915		0.781	
Observations	384	216	384	216	384	216
Panel B. Number of Providers by Provider Quality and Urbanicity						
	1 or 2 star providers		3 or 4 star providers		5 star providers	
	Rural	Urban	Rural	Urban	Rural	Urban
A) December*2020 coefficient	0.156+	0.431	0.766**	1.708**	-0.500*	-1.819**
	(0.083)	(0.42)	(0.254)	(0.591)	(0.23)	(0.619)
B) February 2020 mean	1.41	7.25	11.02	45.25	10.09	38.42
C) Effect in % (A/B)	11.08%	5.94%	6.95%	3.78%	-4.96%	-4.74%
D) Diff. p-value	0.531		0.233		0.938	
Observations	384	216	384	216	384	216

Note. Standard errors in parentheses. + p<.10, * p<.05, **p<.01

Table A2.

Number of Providers by County SES and Provider Quality

	1 or 2 star providers				3 or 4 star providers				5 star providers			
	1st SES Quartile	2nd SES Quartile	3rd SES Quartile	4th SES Quartile	1st SES Quartile	2nd SES Quartile	3rd SES Quartile	4th SES Quartile	1st SES Quartile	2nd SES Quartile	3rd SES Quartile	4th SES Quartile
A) December*2020 coefficient	0.100	0.600*	0.020	0.300	0.660	2.400**	-0.020	1.380*	-0.580	-0.100	-1.160*	-2.060**
	(0.078)	(0.248)	(0.206)	(0.550)	(0.464)	(0.575)	(0.411)	(0.585)	(0.429)	(0.450)	(0.467)	(0.736)
B) February 2020 mean	0.96	2.68	2.64	7.76	15.36	19.04	23.96	35.00	12.00	17.80	19.92	31.44
C) Effect in % (A/B)	10.42%	22.39%	0.76%	3.87%	4.30%	12.61%	-0.08%	3.94%	-4.83%	-0.56%	-5.82%	-6.55%
D) Diff. p-value			0.264				0.002				0.134	
Observations	150	150	150	150	150	150	150	150	150	150	150	150

Note. Standard errors in parentheses. + p<.10, * p<.05, **p<.01

Appendix A. Description of Data Sources

The North Carolina Division of Child Development and Early Education Statistical Reports are updated through monitoring visits that stopped at the beginning of March 2020. Although filling out the COVID-19 Child Care Provider Survey was not mandatory, it was strongly recommended and most providers continued reporting their data daily through this tool. Because we have February 2020 data from both sources, we are able to assess the response rate from providers and the overlap between the two sources in our outcome variables. We first compare the average enrollment and number of providers reported in the two sources. We find small discrepancies between these two sources -- the provider survey has only 11% less total enrollment and 9% less number of providers than the Statistical Report data. Figure A1 illustrates the total enrollment and provider data from our two sources of data.

We also check the county-by-county differences in enrollment and number of providers in the two sources. The within-county comparison shows similar levels of enrollment and number of providers between the two sources. On average, counties in the provider survey have 8% less enrollment and 7% less number of providers than reported in the Statistical Report data. Because the Statistical Report data include all licensed providers, our check suggests that an average of 93% of providers responded to the provider survey in February, a much higher response rate from providers than reported in prior studies (e.g., NAEYC, 2020a, 2020b). Nevertheless, we recognize the potential bias resulting from the non-respondents and discuss this limitation in the main text.

Figure A1.

Average Enrollment and Number of Providers using the DCDEE Statistical Reports and the COVID-19 Child Care Provider Survey. North Carolina, 2018-2020.